A COMPARATIVE STUDY ON PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION BREATHING TECHNIQUES AND CONVENTIONAL BREATHING TECHNIQUES IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

A Dissertation Submitted In Partial Fulfillment

Of The Requirements For The Degree Of

MASTER OF PHYSIOTHERAPY

With Specialization In

ADVANCED PHYSIOTHERAPY IN CARDIO RESPIRATORY

(Register Number: 27091413)

Submitted to

THE TAMILNADU Dr. M.G.R MEDICAL UNIVERSITY
Chennai

JKK MUNIRAJAH MEDICAL RESEARCH FOUNDATION

COLLEGE OF PHYSIOTHERAPY

Department of Post Graduate Studies
Komarapalayam - 638 183

APRIL - 2011

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Mr. D.KANNAN, M.P.T., (Neuro) MIAP,
Principal,
JKKMMRF College of Physiotherapy,
Komarapalayam.

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INTRODUCTION

Back ground of the problem.

Chronic obstructive Pulmonary Disease is a major cause of health care burden world wide and leading cause of death that is increasing in prevalence. Data's from most of the asian Countries clearly paints towards a huge burden caused by Chronic Obstructive Pulmonary Disease. This disease is also an important and economic burden on patient and health care infrastructure of country.

Chronic Obstructive Pulmonary Disease (COPD) en-compasses Chronic Bronchitis and Emphysema. Chronic Obstructive pulmonary Disease also known as chronic obstructive Lung Disease (COLD).

In patients with Chronic Obstructive Pulmonary Disease there is a long history of use of breathing exercise in improving quality of life. Alvan Barach and William F miller were the first U.S physicians to employ breathing training in patients with obstructive lung disease. They recognized over 30 years ago that such patients could improve their dyspnoea by consciously altering their breathing pattern. Present studies also reveals the positive effects of breathing exercise in rehabilitation of Chronic Obstructive Pulmonary Disease patients.

Prevalence

Chronic Obstructive Pulmonary Disease is currents 4th leading cause of death world wide. Globally chronic obstructive Pulmonary Disease by year 2020 is expected to rise to 3rd position as a cause of death and at 5th position as a cause of disability.

The global burden study of this disease estimated that world wide prevalence of Chronic Obstructive Pulmonary Disease is 9.34 per 1000 men and 7.33 per 1000 women these estimates being based on total population.

This disease is seen mostly among older adults. True age specific prevalence will be much higher in countries where tobacco smoking is common. Tobacco smoking remains the most important risk factor identified as a cause of Chronic Obstructive Pulmonary Disease. Besides this air pollution, occupational pollution, deficiency of Alphal-antitrypsin are other causes. Chronic Obstructive Pulmonary Disease in India has been recognized and investigated with help of surveys conducted in different population for last 40 years. Prevalence rate varying from 2 to 22% in men and 1.2 to 19% in women have been shown in different reports. [based on report from, Department of Pulmonary medicine, Post Graduate institute of medical Education and research, chandigarh, India.]

Need and Significance of Study

Reduction of maximum expiratory rate and slow forced emptying of lung are common problems seen in chronic obstructive pulmonary

Disease. Chronic Obstructive pulmonary Disease also causes dyspnoea and reduction of exercise tolerance.

Pulmonary rehabilitation has gradually become popular for patients with severe lung disease especially chronic Obstructive Pulmonary Disease. Programs used in pulmonary rehabilitation are multi disciplinary and use various therapeutic components. This multi disciplinary approach aims at increasing exercise capacity, improvement of quality of life, decreasing dyspnoea and reduces hospital admissions when rehabilitation is used. The main objectives of physical therapy for Chronic Obstructive Pulmonary Disease patients are dyspnoea control, increase maximum expiratory flow rate by reducing air trapping and improving exercise tolerance. These can be achieved from various techniques but more focus in this study goes towards attaining these objectives through Proprioceptive Neuromuscular Facilitation breathing [PNF breathing], Purse-Lip Breathing and Diaphragmatic Breathing techniques. Hence this study is done to compare the effects between proprioceptive Neuromuscular Facilitation Breathing and Conventional Breathing Techniques which includes Diaphragmatic Breathing and Pursed-Lip breathing in Chronic Obstructive Pulmonary Disease patients.

Statement of Problem

This investigation is done to compare Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques in patients with Chronic obstructive Pulmonary Disease, there by improving dyspnoea control, peak expiratory flow rate and exercise tolerance.

This study is entitled as,

'A Comparative study on Proprioceptive neuromuscular Faclitation Breathing Technique and Conventional Breathing Techniques in patients with Chronic Obstructive Pulmonary Disease".

OPERATIONAL DEFINITIONS.

Comparative Study:

Study which compares Proprioceptive neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques.

Proprioceptive neuromuscular Facilitation Breathing Technique:

Proprioceptive Neuromuscular Facilitation Technique [PNF] is an approach to therapeutic exercise that combines functionally based diagonal patterns of movement with techniques of neuromuscular facilitation to evoke motor responses and improve neuromuscular control and function. This widely used approach to exercises was developed in 1940s and 1950s by the pioneering work of kabat, Knott and Voss. [Carolyn Kisner, Lynn Allen Cobly – Therapeutic exercise foundation and Technique, 4th Edition 2002].

Application of proprioceptive and tactile stimuli for improving lung function of patients with pulmonary disease is termed as Proprioceptive Neuromuscular Facilitation Breathing Technique. Commonly practiced facilitatory techniques are diaphragmatic stretching and intercostals stretching. Stimuli produced by these techniques are being capable of producing reflexive responses in ventilatory muscles. In

clinical settings these responses are accompanied by involuntary coughing, changes in breath sounds on auscultation, rapid return of mechanical chest wall stability, less necessity for suctioning, a more normal respiratory pattern and retention of the improved breathing pattern for some time after the treatment period. Majority of the responses to proprioceptive neuromuscular stimuli are mediated by muscle stretch receptor via dorsal root and inter segmental reflexes.

Conventional Breathing Techniques

Breathing exercises which are conventionally used for rehabilitation of the patients with Chronic Obstructive Pulmonary Disease.

They are Pursed-lip and Diaphragmatic breathing.

Pursed-Lip Breathing

This is a breathing technique which keeps airways open by creating a back pressure in it. It is taught to help the patient with Chronic Obstructive Pulmonary Disease to deal with attacks of shortness of breath. Patient performs this exercise by inspiring slowly and deeply through nose and exhaling through mouth by loosely pursing lips.

Diaphragmatic Breathing.

This is an exercise which is meant to increase the excursing of the diaphragm, decrease the work of breathing, improve efficiency of ventilation, gas exchange and oxygenation.

Chronic Obstructive Pulmonary Disease patients with predominantly upper thoracic expansion and little abdominal movement, or with inward movement of lower ribs during inspiration may be the best candidates for Diaphragmatic Breathing. Instructions for Diaphragmatic Breathing usually begins in semi-fowlers or side lying position with a pillow support to achieve relaxation. Once Diaphragmatic Breathing is mastered in the semi-fowlers or side lying position, patients learn to perform it when sitting and standing for carry over to more functional activities. Diaphragmatic Breathing should also be practiced during walking and stair climbing.

Steps for performing Diaphragmatic Breathing are

Place patient's dominant hand over the mid abdominal area and non dominant hand over mid sternum. Ask the patient to inhale slowly and deeply through nose. Direct the patient's attention to gradual rise of dominant hand during the slow inspiration and allow the patient to exhale slowly through mouth after completion of inspiration.

Chronic Obstructive Pulmonary Disease:

Chronic Obstructive Pulmonary Disease is the internationally preferred term encompassing Chronic Bronchitis and Emphysema. By definition Chronic Obstructive pulmonary Disease in a chronic, slowly progressive disorder characterized by airflow obstruction which does not change markedly over several months.

AIMS AND OBJECTIVES

Aims

This investigation aims to compare Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques in patients with Chronic Obstruction Pulmonary Disease. There by improving dyspnoea control, peak expiratory flow rate and exercise tolerance.

Objectives

- To improve dyspnoea control.
- To improve peak expiratory flow rate there by improving lung function.
- To improve exercise tolerance.

HYPOTHESIS

Null hypothesis

There is no significant difference between Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques in improving rate of perceived exertion in patients with Chronic Obstructive Pulmonary Disease.

There is no significant difference between Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques in improving peak expiratory rate in patients with Chronic Obstructive pulmonary Disease.

There is no significant difference between proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques in improving six minute walking distance in patients with Chronic Obstructive Pulmonary Disease.

Alternate hypothesis

There is significant difference between Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques in improving rate of perceived exertion in patients with Chronic Obstructive Pulmonary Disease.

There is significant difference between Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional

Breathing Techniques in improving peak expiratory flow rate in patients with Chronic Obstructive Pulmonary Disease.

There is significant difference between Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques in improving six minute walking distance in patients with Chronic Obstructive Pulmonary Disease.

Proprioceptive Neuromuscular Facilitation Breathing Techniques [PNF Breathing Techniques].

Physiotherapy for respiratory and cardiac problems – adults and paediatrics – 3rd edition, 2000.

Proprioceptive and factile stimuli selected produce remarkably consistent reflexive responses in ventilatory muscles which produce inspiratory expansion of ribs, increased epigastric excursion, visibly often palpably increased tone in the abdominal muscles and lowers the respiratory rate. In the clinical settings these responses are accompanied by involuntary coughing, changes in breath sounds on auscultation, rapid return of mechanical chest wall stability, less necessity for suctioning, a more normal respiratory pattern and retention of the improved breathing pattern for some time after the treatment period. Majority of the responses to proprioceptive neuromuscular stimuli are mediated by muscle stretch receptors via dorsal root and inter segmental reflexes.

AL Ries, B Ellis, RW Hawkins.

Modified Proprioceptive Neuromuscular Facilitation in patients with Chronic Obstructive pulmonary Disease produced good results on exercise performance tests and endurance tests. Ratings of perceived breathlessness and fatigue decreased significantly in patients for several tests. Proprioceptive Neuromuscular Facilitation Breathing training may be beneficial in the rehabilitation of patients with Chronic Obstructive Pulmonary Disease and warrants further investigation.

Chest Journal, Volume-93, 688-692/ May-220/

Bartlome R Celli.

Modified Proprioceptive Neuromuscular Facilitation Breathing Techniques combined with arm exercise found effective for pulmonary rehabilitation because such exercise conditions muscles used in activities of daily living and also this helps to control respiratory rate, breathing pattern, decrease air trapping, and decrease work of breathing.
Postgraduate medicine journal/Volume-103/Number-4/April-2001.

PJ Wijkstra, TW Vander Mark, J Kraan, R Van Altena, GH Koeter, DS Postma.

Propriocepitve Neuromuscular Facilitation Breathing training in patients with Chronic Obstructive Pulmonary Disease improves dyspnoea, 6 minute walking distance, maximal work load and reduced their work of breathing. The exercise affected both psychological and physiological aspects of dyspnoea as well as tolerance and adaptation to exercise. Tolerance and adaptation to exercise is most probably due to the mechanism by which Proprioceptive Neuromuscular Facilitation Breathing training improves dyspnoea.
European respiratory journal 1996-9-104-110.

DIAPHRAGMATIC BREATHING.

Carolyn Kisner, Lynn Allen Colby

Diaphragmatic Breathing Exercises are designed to improve the efficiency of ventilation, decreases work of breathing, increase the excursion of diaphragm, improve gas exchange and oxygenation.

Diaphrgmatic Breathing Exercises are also used to mobilize secreations during postural drainage.
Therapeutic exercise foundations and techniques-4th edition,2003.

Dechman, Gail, Wilson, Christne R.

Diaphragmatic Breathing improves the ventilation, decreases work of breathing, decreases dyspnoea and normalize breathing pattern in patients with Chronic Obstructive Pulmonary disease.
Cardio-plumonary Phsyiotherapy journal, June-2002.

Bartolome R.

Diaphragmatic Breathing changes the breathing pattern and it is most helpful in reducing respiratory rate, minute ventilation and it also increases tidal volume in severe Chronic Obstructive Pulmonary Disease patients.
Postgraduate medicine journal-Volume-103/Number-4/April 1998.

M Vitacca, E Clini, L Bianchi, N Ambrosino

In severe Chronic Obstructive pulmonary Disease patients with hypercapnea, deep Diaphragmatic Breathing produced improvement of blood gases due to increase in alveolar ventilation.
European respiratory journal, 1998-11:408-415.

John R Bach – 1996.

Diaphragmatic Breathing has been one of the corner stones of breathing training. Diaphragmatic Breathing often used in conjunction with Pursed-lip Breathing, helps to improve oxygenation, complete exhalation and elevate diaphragm to higher resting position within the thoracic cage. Patients reported reduced dyspnoea and clinical improvements when using Diaphragmatic Breathing.
Pulmonary rehabilitation – The obstructive and paralytic conditions.

Hiroaki Nomori, Ryuichirou Kobyashi, Gentarou Fuyano, Shojiorh Morinaga, Hiroshi Yashima.

Diaphragmatic Breathing improves the ability to expectorate sputum there by improves the ventilation and increases the oxygen saturation, reduces dyspnoea in Chronic Obstructive Pulmonary Disease patients.
Chest journal – June – 1994.

Alexandra Hough – 1991.

Augmented abdominal movement during inspiration increases the depth of breathing and decreases the dead space and relaxes the shoulder. Besides this increases ventilation, reduces the work of breathing there by reduces dyspnoea.
Physiotherapy in respiratory care, First Edition, 1991.

Miller. et al.,

Training in Diaphragmatic Breathing is effective in increasing diaphragmatic excursion, there by increasing tidal volumes and decreasing respiratory rate, he also noted improvement in blood gases following Diaphragmatic Breathing. So he considers this technique as always been one of the main tools in breathing retraining.

Ambrossino. et.al.,

Reported improvements of maximal exercise tolerance in mild Chronic Obstructive Pulmonary Disease patients undergoing Diaphragmatic Breathing.

PURSED-LIP BREATHING.

Garrod R, Dallimore K, Cook J, Davies V, Quade K.

Pursed-Lip Breathing during exercise and recovery results in low post exercise respiratory rate and reduces breathlessness compared with exercise without pursed-Lip Breathing.
Chronic respiratory disease journal, Volume-2, Number-2, May-2005.

Jadranka Spahija, Michael De Marchle, Alejandro Grassino

Pursed-Lip Breathing performed by patients with Chronic Obstructive Pulmonary Disease promotes a slower and deeper breathing pattern both at rest and during exercise. Pursed-Lip Breathing during

exercise capable of relieving dyspnoea by decreasing end expiratory lung volume.
Chest journal 2005: 128: 640-650

Bianchi R, Giglotti F, Romagnoli I, Lanini B, Castellani C, Grassini M, Scano G.

Compared with spontaneous breathing patients, Pursed-Lip Breathing patients exhibited significant reduction in end expiratory volume, increased expiratory time, increase in tidal volume, by this way reducing breathlessness.
Chest journal 2004 February; 125 (2):459-65.

Dechman G, Wilson CR.

Pursed-Lip Breathing slows respiratory rate, decreases resistive pressure drop across airways, decreases airway narrowing during expiration, and this accounts for reduction in dyspnoea.
Journal of Physiotherapy, 2004 December;84(12): 1189-97.

Ritz T, Roth WT.

Theoretical analysis and empirical observations suggest positive effects of Pursed-Lip Breathing in relieving dyspnoea.
Behavioural modification, 2003. October;27(5):710-30.

RK Gosslink

Pursed-Lip Breathing reduces respiratory rate, dyspnoea and arterial partial pressure of carbon dioxide [PCo2] and improve tidal volume and oxygen saturation in resting conditions.
Journal of rehabilitation research and development, Volume-40, Number-5, Septermber/October 2003, supplement-2, Pages 25-34.

Jones AY, Dean E, Chow CC.

Breathing exercise like Diaphragmatic Breathing and Pursed-Lip Breathing reduce oxygen cost [work of breathing] in Chronic Obstructive Pulmonary Disease Patients.

Jennifer A Prayor, Ammani Prasad-2002.

Pursed-Lip Breathing practiced by patients with Chronic Obstructive Pulmonary Disease is effective in reducing discomfort associated with dyspnoea, this technique has been shown to decrease respiratory rate, increase tidal volume and improves gas exchange.
Physiotherapy for cardiac and respiratory problems-Adult and Paediatrics, third Edition, Page-249.

Carolyn Kisner, Lynn Allen Colby-1996.

Pursed-Lip Breathing decreases respiratory rate increase tidal volume and improves exercise tolerance in Chronic Obstructive Pulmonary Disease patients.
Therapeutic Exercise Foundation and Technique, Third Edition, Page-671.

Alexandra Hough. 1991.

Breathing with Pursed-Lip Prevent airway closure and air trapping in patients of chronic Obstructive Pulmonary disease, by this way it reduces dyspnoea.

Physiotherapy therapy-A problem solving approach, First edition, qte-104.

PEAK EXPIRATORY FLOW RATE

Adam Hart Davis

Peak expiratory flow rate [REFR] is a test that is in common practice and which is used for indicating the presence of air flow obstruction in chronic obstructive pulmonary disease. This test is considered as a valid tool for assessing obstruction in chronic lung diseases.

Health care science Week Journal, 2005.

Hutchison's clinical methods. 21st Edition. 2003.

Peak expiratory flow rate is measured by peak expiratory flow meter. Peak expiratory flow meter is light, inexpensive and very easy to use. People with chronic obstructive pulmonary disease can use it to monitor themselves about their disease condition.

Cash's test book of chest, heart and valvular diseases for physiotherapy, 4th Edition. 1993.

Peak expiratory flow rate can be measured using a wright's peak flow meter. From a position of full inspiration air is forcibly expired across a pivoted vane or a light weighted piston both of which are spring loaded and encased. The displacement of piston is proportional to maximum flow rate. Peak expiratory flow meter is considered as the simplest way of measuring lung function.

Alexandra Hough, 1991.

Peak flow meter provides a quick, simple indication of air flow obstruction. Home assessment of peak expiratory flow rate is necessary for the patients with Chronic Obstructive Pulmonary Disease of know the condition of disease and effect of drug therapy.
Physiotherapy in respiratory care, 1st Edition. 1991.

MODIFIED BORG SCALE FOR RATING PERCEIVED EXERTION.
Chetta A, Castagnaro A, Del Donno M, Pisi G, Malorgio R, Olivieri D.

In asthmatics the broncho-constriction associated breathlessness can be evaluated well with Borg Scale. Also found that reliability and ease of use of this tool is high.
Journal of asthma, May 2003.

Sandiego, Karla R Kendrick, Sunitha C Baxi, Robert M Smith.

Modified borg scale is a valid and reliable assessment tool for dyspnoea. It correlates well with other clinical parameters and it could be useful when assessing and monitoring out come of treatment in patients with broncho-spasm.

Modified Borg Scale found effective is assessing and monitoring patients with Chronic Obstructive Pulmonary disease.

Modified Borg Scale found useful in patients with Chronic Obstructive Pulmonary Disease.

Modified Borg Scale found useful in patients too dyspnoeic to perform objective testing such as peak flow.

Patients gave the modified Borg Scale tool a high satisfaction rating on ease of use. They reported that language used in the scale adequately expressed their dyspnoea.
Official journal of American thoracic society, May 2001.

Denis E, 'O' Donnel, Mluham, Katherine A webb,

Borg dyspnoea rating and measurements of intercostals endurance time taken during sub maximal cycle exercise testing are highly reproducible and responsive to change in severe chronic Obstructive pulmonary Disease.
Official journal of American thoracic society, December, 2000.

Balman, et.al.,

Found that modified Borg Scale was a reliable tool quantifying dyspnoea in subjects with Chronic Obstructive Pulmonary Disease who are undergoing physical performance tests.

SIX MINUTE WALK TEST

Carter R.

Six minute walk test can be correlated better with various pulmonary function studies. Six minute walk test is sensitive in differentiating patients with low or high work capacity. Six minute walk test can be used to assess the functional capacity in patients with Chronic Obstructive Pulmonary Disease.
Respiratory medicine Journal, may 2003.

Cammari B, East Wood PR, Cecins NM, Thompson PJ, Jenkin S.

The six minute walk test [6Mwt] is a most commonly used exercise test in pulmonary rehabilitation. This is test considered as an appropriate test for measuring exercise performance in patients with Chronic Obstructive Pulmonary Disease.
Journal of School of Physiotherapy, curtain university of technology, peth-Australia. 2002.

GH Guyatt, SO Pugstey, MJ Sullivan, PJ Thompson, L Berman, NL Jones, EL Fallen and DW Taylor

Walking tests are frequently used to document effects of treatment on exercise capacity. The six minute walk test is an ideal tool for measuring beneficial effects of therapeutic maneuvers used in Chronic Obstructive Pulmonary Disease patients.
Chest journal, Volume 2, May 2002.

Marry B King, James O Judge, Robert Whipple and Lestle Wolfson

"in our study Reliability and responsiveness of two physical erformance measure", six minute walk test found more reliable than 'Eight item Physical performance test'. In assessing exercise performance in patients with Chronic Obstructive Pulmonary Disease".
Physiotherapy journal-Volume-80 Number-1, January-2000.

Guyatt GH, Town Send M, Keller J, Singer J, Nogradi S.

Six minute walk test followed by chronic respiratory distress questionnaire is a valid measure of functional status for clinical trial in chronic lung disease, its validity and reliability found to be high in checking functional status in patients with chronic lung disease.
Respiratory medicine journal, September 1991.

PATHO-PHYSIOLOGY

Harsh mohan's text book of pathology-5th edition-2005.

The most important etiologic factors responsible for majority of cases of Chronic Obstructive Pulmonary Disease are cigarette smoking and

atmospheric pollution; other contributing factors are occupation, infection, familial and genetric factors. Heavy cigarette smokers are 4-10 times higher prone to develop Chronic Obstructive Pulmonary Disease. Smoking appears to act on lungs in number of ways:

- It impairs ciliary movement
- Inhibit function of alveolar macrophages.
- It leads to hypertrophy and hyperplasia of mucous secreting glands.
- Causes obstruction of smaller airways
- It stimulate vagus and causes broncho-constriction.

Protease anti protease hypothesis.

Alpha-1-antitrypsin is a glycoprotein synthesized and circulated through blood. Alpha-1-antitrypsin inhibits protease which is capable of destructing lung parenchyma. Protease is developed from neutrophils. Deficiency of alpha-1-antitrypsin causes increased protease activity. Oxidants present in the cigarette smoke reduces Alpha-1-antitrypsin activity, more than that smokers have ten times more number of phagocytes and neutrophils than normal man.

Pollutants like sulfur dioxide, nitrogen dioxide, dust and toxic fumes increases the risk of developing Chronic Obstructive Pulmonary Disease.

Certain occupations associated with cotton mills, plastic factories etc contribute to disabling Chronic Obstructive Pulmonary disease in such individuals.

Bactrerial , viral and mycoplasmal infections do not initiate Chronic Obstructive Pulmonary Disease but this can cause exacerbation of this condition. Pathological Changes in Chronic bronchitis includes, thickening of bronchial walls, lumen of bronchi and bronchioles contain mucus plug and purulent exudates, hyperthrophy and hyperplasia of mucus secreting glands, squamous metaplasia and dysplasia of bronchial epithelium, intra luminal and peri bronchial fibrosis.

Pathological changes in emphysema includes, Pale and voluminous lungs, fibrosis and inflammation of bronchial wall, presence of bullae due to rupture of adjacent air spaces and blebs which develop from escape of air directly into pleural space.

Kumar and Clark's Clinical medicine, 5th Edition, 2002.

Smokers have neutrophil granulocytes present within the lumen of lung that are absent in non-smokers. Additionally smaller airways of smokers are infiltrated by granulocytes.

These granulocytes which are capable of releasing proteases possibly help to produce chronic obstructive pulmonary diseases. It is suggested that an imbalance between protease and anti protease activity may produce the damage to lungs. Alpha-1-antitrypsin is a major serum anti protease which can be inactiviated by cigarette smoke. Patients with chronic Obstructive pulmonary disease cope badly with respiratory infection, which are offen the precipitating cause of acute exacerbations of the disease.

The most common pathological finding in Chronic Obstructive Pulmonary Disease are, hypertrophy of mucus secreting glands, additionally there will be increase in number of mucus secreting goblet cells, this leads to increased mucus production and the regular expectoration of sputum. Microscopically there is infiltration of walls of bronchi and bronchioles with inflammatory cells, inflammation leads to narrowing of airways. Progression of disease leads to squamous cell metaplasia and fibrosis of bronchial walls.

Essentials of Cardio-Pulmonary Physiotherapy, Ellen A Hillegass and H Steven Sadowsky. 1998.

Cigarette smoking is the most important etiologic factor in the development of both Chronic Bronchitis and Emphysema, Emphysema found rare in non-smokers.

Other factors that are associated with the development of Chronic Obstructive Pulmonary Disease are environmental air pollution and hereditary deficiency of Alpha-1-antitrypsin.

Smoking produces low level chronic inflammation in lungs, increased number of phagocytic cells, neutrophils and alveolar macrophages. These cells are produced in response to a particular matter in tobacco smoke, both neutrophils and macrophages may release proteolytic enzymes into lungs and be involved in break down of elastin in the lung of smokers.

Inherited deficiency of Alpha-1-antitrypsin is a rare cause. It is a protein that function as a protease inhibitor. Alpha-1-antitrypsin

deficiency causes Chronic Obstructive Pulmonary Disease and its rate of reducing lung function in nearly twice as the average rate of decline for patients without this deficiency.

Other factors that may contribute to lesser extent to development of Chronic Obstructive Pulmonary Disease include atmospheric pollution, passive smoking, occupation etc.

Clinical Presentation.

Harsh mohan's test book of pathology. 5th edition. 2005.

In chronic obstructive pulmonary diseases that is a considerable overlap of clinical features between chronic bronchitis and pulmonary emphysema as well as there are some contrasting features between both conditions.

Contrasting salient features of predominant chronic bronchitis and predominant pulmonary emphysema are

	Chronic Bronchits	Emphysema
Age	5th decade	6th decade
Cough	Before dyspnoea	After dyspnoea
Dyspnoea	Mild	Severe
Sputum	Copious/Purulent	Scanty/mucoid
CXR	Increased bronchovascular markings with large heat.	Large inflated lung and small heart
PaCo2	50-60 mm Hg	35-40 mm Hg
PaO2	45-60 mm Hg	65-75 mm Hg
Cor-pulmonale	Frequent	Rare
Infections	Frequent	Rare
Cyanosis	Common	Rare
Lung capacity	normal	Increased [barrel chest]

Contrasting salient features of predominant Chronic Bronchitis and predominant pulmonary Emphysema.

Harrison's principles of internal medicine. 14th edition. Volume 2.

Salient features of two types of Chronic Obstructive pulmonary Disease are,

	Emphysema	Chronic Bronchits
Age of diagnosis	60	50
Dyspnoea	Severe	mild
Cough	After dyspnoea starts	before dyspnoea starts
Sputum	Scanty/mucoid	copious/Purulent
Bronchial infection	Less frequent	more frequent
Chest film CXR	Hyper inflation with bullous changes, small heart	increased bronchovascular marking of bases, large heart
PaCo2	35-40 mm Hg	50-60 mm Hg
PaO2	67-75 mm Hg	45-60 mm Hg
Pulmonary hypertension	Non to mild	Moderate to severe
Cor-pulmonale	Rare	Common
Elastic recoil	Decreased	Normal
Resistance	Normal to slight increase	High
Diffusing capacity	Decreased	Normal to slight decrease.

Davidson's principles and practice of medicine. 18th edition.

The disease generally starts with repeated attacks of productive cough, usually after colds during winter months, which shows a steady increase in severity and duration with successive years until cough is

present all the year round. There after patient suffers recurrent infection, exertional breathlessness regular morning cough, wheeze and occasionally chest tightness. Sputum may be scanty/mucoid, tenacious and occasionally streaked with blood during infective exacerbations. Frankly purulent sputum is indicative of bacterial infections, which occur frequently in these patients. Breathlessness is aggravated by infections, excessive cigarette smoking and adverse atmospheric pollution.

In patients with mild to moderate disease the respiratory examination may be normal. However variable number of inspiratory and expiratory rhonchi, mainly low and medium pitched are audible in most of the patients. Crepitations [crackles] not always, which disappear after coughing may be audible over the lower zones.

Physical signs associated with severe disease are,

- Rhonchi on forced expiration.
- Reduction in length of trachea, palpable above sternal notch.
- Tracheal tug [tracheal descent during inspiration]
- Contraction of accessory muscles during inspiration.
- Excavation of supra sternal and supra clavicular fossae during inspiration with in drawing of costal margins and inter costal spaces.
- Increased antero posterior diameter of chest relative to lateral diameter.
- Weigh loss
- Pursed-Lip Breathing.
- Central cyanosis
- Peripheral edema due to Car-pulmonale.

- Raised jugular venous pressure, right ventricular heave, long pulmonary second sound, tricuspid regurgitation, Flapping tremor with bounding pulse.

CLASSIFICATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Global initiative for Chronic Obstructive pulmonary Disease (GOLD) Classification. 2005.

Severity	Characteristics
0: At risk	Normal spirometry, chronic symptoms (cough, sputum production)
1 ; Mild COPD	FEV1/FVC,70%, FEV1 greater than or equal to 80% predicted, with or without chronic symptoms (cough, sputum production)
2 : Moderate COPD	FEV1/FVC<70%, FEV1 greater than or equal to 30% to <80% predicted, with or without chronic symptoms (cough, sputum production, dyspnoea).
3 : Severe COPD	FEV1/FVC,70%, FEV1<30% predicted or FEV1<50% predicted plus respiratory failure or clinical signs of right heart failure.

GOLD classification of Chronic Obstructive Pulmonary Disease

Davidson's Principles and practice of medicine, 18th Edition , 1999.

Chronic Obstructive Pulmonary Disease can be classified on the basis of FEV1 as mild , moderate and severe.

Severity	Spirometry	Symptoms
Mild	FEV1-60-79% predicted	Smokers cough, excertional breathlessness.
Moderate	FEV1-40-59% predicted	Excertional breathlessness, wheeze, cough, sputum
Severe	FEV1-<40% predicted	Breathlessness, prominent wheeze and cough, swollen legs.

Classification and diagnosis of Chronic obstructive Pulmonary Disease

FUNCTIONAL LIMITATION.

Current medical diagnosis and treatment 43rd edition. 2004.

Pulmonary function tests early in the course of chronic obstructive pulmonary disease reveal only evidence of abnormal closing volume and reduced mid expiratory flow rate. Reduction in forced expiratory volume in one second [FEV1] and in the ratio of forced expiratory volume to vital capacity [FEV1% or FEV1 ratio] occur later. In severe disease, the forced vital capacity is markedly reduced. Lung volume measurements reveal and increase in total lung capacity. A marked increase in residual volume [RV] which is indicative for air trapping.

API text book of Medicine. 6th Edition, 2001.

In chronic Bronchitis and Emphysema the work of breathing is increased because of altered pressure air flow relationship. The residual volume [RV] and functional residual capacity [FRC] are higher than normal. Total lung capacity [TLC] is increased and vital capacity is reduced [VC]. The most important respiratory function disturbance in Chronic Obstructive Pulmonary Disease is generalized airway obstruction and reduction in FEV1, FEV1/FVC ration and peak expiratory flow rate [PEFR].

Davidson's principles and practice of medicine. 19th edition. 2000.

An abnormal forced expiratory volume in one second [FEV1]<80% predicted with an FEV1/FVC ratio of ,70% predicted and little variation in peak expiratory flow strongly suggest Chronic

Obstructive Pulmonary Disease. Normal FEV1 excludes diagnosis. Lung volume shows an increase in total lung capacity [TLC] and residual volume [RV].

Alveolar under ventilation cause fall in partial pressure of oxygen [Pao2] and often an permanent increase in partial pressure of carbon dioxide [PaCo2].

METHODOLOGY

Present study evaluate the comparison of proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing in patients with chronic Obstructive Pulmonary Disease. The research approach adopted for the study was experimental research approach.

Population of study

Population was chosen from the patients being referring to department of respiratory medicine with diagnosis of Chronic Obstructive Pulmonary Disease. Both male and female patients of age above 45 years were included. The patients included in the study had a forced expiratory volume in one second [FEV1] of 20-60%. All patients were in a stable clinical condition. The patients were not receiving physiotherapy. All patients in the study received training about treatment methods. Informed consent was obtained from all patients. There was no significant difference in all of the pre-treatment variables between proprioceptive Neuromuscular facilitation Breathing Technique and Conventional Breathing Techniques.

Study design

The study conducted in the format of experimental, pre-test, post-test design.

Group I – these patients received conventional Physiotherapy which includes diaphragmatic and Pursed-Lip breathing techniques.

Group II – these patients received both Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques.

Study setting

The study was conducted at out patient department in J.K.K. Munirajah Medical Research Foundation College of Physiotherapy, Komarapalayam and District Head Quarters Hospital, Erode under the supervision of the concerned authorities

Daily Schedule

Daily schedule for study was that patient were seen twice daily. Patients participated in the programme after an hour consumption of food. Informed consent was obtained from all patients. And all were considered for study after prior referral from physician in charge.

Data collection procedure

Prior sanction was obtained from hospital authorities for the study. Patients with chronic Obstructive Pulmonary Disease referred by Pulmonologist, GH , Erode were divided into two groups. Group-I and Group –II using convenient sampling. The 15 patients were taken in each group. Both treatments were applied for 8 minutes each, twice daily. In conventional breathing techniques, both Diaphragmatic and Pursed-lip

breathing procedures were repeated 16 times. Proprioceptive Neuromuscular Facilitation Breathing which includes five techniques, which were repeated six times each. The patients completed a period of 4 weeks treatment programme. Assessment was taken on the 1st day and on completion of treatment after 4 weeks, using assessment form. The outcome measures were taken as per the following procedure.

Sample and Sample method.

The subjects were selected by convenient sampling. The patients with clinical diagnosis of Chronic Obstructive Pulmonary Disease were assigned to group-I and Group II each group had 15 patients.

Duration.

Duration of study was 6 months & 5 months of data collection.

Inclusion Critieria.

- All patients referred to physiotherapy with diagnosis of Chronic Obstructive Pulmonary Disease with duration more than 10 years were included.
- Both male and female patients with stable clinical condition.
- Patients with mild to severe Chronic Obstructive Pulmonary disease.
- Patients above 45 years.
- Patients with forced expiratory volume in one second [FEV1] of 20%-60%.

Exclusion Criteria

- Patients with recent Cardiac Disorders.
- Patients with infectious diseases such as tuberculosis, pneumonia etc.
- Neuromuscular and Musculoskeletal disorders who need exercise modification.
- Patients with psychiatric illness.
- Patients with malignancies such as carcinoma of lung.
- Patients with unhealed scars and incisions over chest wall.
- Patients with open wounds over chest wall.
- Patients with fractures e.g. Rib fracture.
- Patients with severe osteoporosis.
- Non co-operative patients.

PARAMETER

Tools and materials

The study was conducted in a experimental, pre-test, post-test design. The parameters recorded were,

1. Peak expiratory flow rate
2. Rate of perceived exertion [Borg scale]
3. Six minute walking distance.

For evaluating the efficiency of reducing symptoms of patients with diagnosis of chronic obstructive pulmonary disease. Following tools are used to evaluate the patient's response.

1. Evaluation chart
2. Daily assessment chart

3. Stethoscope
4. Peak flow meter
5. Stop watch
6. Pillows
7. Sphygmomanometer
8. Source of oxygen
9. Chair that can be moved along walking course
10. Inch tape.

For measuring Peak expiratory flow rate:

Peak expiratory flow rate measured in upright sitting position in bed with neck in neutral position and shoulders are relaxed. Patients were asked to take a deep breath and put the mouth piece into their mouth. They were asked to close the lips tightly around the mouth piece and to blow out as hard as possible from the positionof maximum inspiration. This procedure was repeated three times. Highest of three recordings wre recorded. After completing 4 weeks time, post treatment values are taken after the last day (30^{th} day) of treatment.

For measuring rate of perceived exertion.

A six minute walk test was performed in level ground in the corridor of GH, which measures 25 meters long. Patients were seated at rest in chair located near the starting position for at least ten minutes before the test. During this time, pulse, blood pressure and dyspnoea using modified borg Scale were measured. After giving instructions patients were positioned in standing at the starting line. Patients were instructed to walk from end to end at their on pace, attempting to cover as

much distance possible in 6 minutes. Patients could stop or even sit down if necessary. After completion of test distances were measured and patient rated maximum dyspnoea immediately after the test using 10 point modified Borg Scale with ten as the maximum score.

After completion of treatment session of 4 weeks all measurements were repeated to obtain post treatment values after last day (30th day) of treatment.

PRODUCES

Physiotherapy Techniques

After baseline measurement, 30 patients with chronic obstructive Pulmonary Disease were equally assigned into treatment groups, Group-I and Group-II.

The Group-I underwent treatment consisting of Diaphragmatic and Pursed-Lip breathing techniques for 8 minutes, 2 times daily for 4 weeks.

Diaphragmatic breathing Exercise:

The diaphragm controls breathing at an involuntary level, but patient can be taught breathing control by correct use of diaphragm and relaxation of accessory muscles.

Procedure for performing this exercise are;

- Prepare patient in relaxed and comfortable position such as semi fowler's position [reclined sitting], evaluate the breathing pattern,

and demonstrate correct method of Diaphragmatic breathing. Place therapist's hands on rectus abdominis just below the anterior costal margin.

- Ask the patient breathe in slowly and deeply through the nose. Have the patient keep shoulders relaxed and upper chest quiet, allowing abdomen to rise.
- Then tall the patient to slowly let all air out using controlled expiration through mouth.
- Have the patient practice this three of four times and then rest. Do not allow patient to hyper ventilate.
- Allow the patient to practice Diaphragmatic breathing by kepping his/her hand over abdomen.
- Patient is discouraged to perform forceful or too much prolonged expiration during performance of this exercise.

Pursed-Lip breathing Exercise;

Patient are encouraged to exhale through pursed lips during controlled breathing technique [Diaphragmatic breathing]. Pursed-lip Breathing creates an obstruction to air flow at mouth that decreases the flow of exhaled air and increases the airway pressure, decreasing the transmural pressure gradient and maintaining the patency of collapsible airways during exhalation. This process help to reduce air trapping, respiratory rate, PaCo2, and increase the tidal volume procedure for performing this exercise are,

- Prepare patient in relaxed and comfortable position such as semi Fowler's position.
- Explain to the patient that expiration must be relaxed [passive] and that contraction of abdominals must be avoided.

- Place therapist's hand over the patient's abdominal muscles to detect any contraction of abdominals.
- Instruct the patient to breathe is slowly and deeply.
- Then have the patient loosely purse the lips and exhale slowly twice as long as inhalation.
- Patient is discouraged to perform forceful or too much prolonged expiration during performance of this exercise.

Group-II underwent treatment consisting of both, proprioceptive Neuromuscular facilitation Breathing Technique and Conventional breathing Techniques for 8 minutes, 2 times daily for 4 weeks.

Proprioceptive Neuromuscular Facilitation Breathing Techniques:

All procedures and techniques are used in the area of care. Hand alignment in particularly important to guide the force in line with normal chest motion. Stretch reflex is used to facilitate the initiation of inhalation. Continue with repeated stretch through range of increase in inspiratory volume. Appropriate resistance strengthens the muscles and guides the chest motion. Preventing motion on the stronger side will facilitate activity on weaker side.

Patient in Supine:

Place both hands on sternum and apply oblique downward pressure. Caudal and medical direction towards the sacrum. Apply pressure on the lower ribs diagonally in a caudal and medial direction with both hands by placing both hands obliquely with the fingers

following the line of ribs. Exercise over upper ribs are given in the same way the placing hands on the pectoral muscles.

Patient in side lying:

Place hands on the area of treatment over chest wall and give pressure diagonally in a caudal and medial direction to follow the line of ribs. In side lying the supporting surface will resist the motion of the other side of chest. Use one hand over sternum and other over back to stabilize and give counter pressure.

Patient in prone

Give pressure caudally along the line of ribs. Place hands on each side of rib cage over the area to be emphasized. Fingers follow the line of ribs.

Prone on elbows:

Place one hand the sternum and give pressure on the dorsal and caudal direction. Put the other hand on the spine at the same level for giving stabilizing pressure, use the prone position hand placement and pressure.

Facilitation of Diaphragm:

Diaphragm is facilitated directly by pushing upward and laterally with thumb from below the rib cage. Apply stretch and resist the downward motion of contracting diaphragm. The patient's abdominal

muscles must be relaxed to reach the diaphragm. If this is difficult flex both hips to get more relaxation in the abdominal muscles and the hip flexor muscles. To give indirect facilitation for diaphragmatic motion, place hands over abdomen and ask patient to inhale while pushing up into gentle pressue. Teach the patient to perform this facilitation by themselves.

STATISTICAL TOOL

The 't' test was used to compare peak expiratory flow rate, rate of perceived exertion and six minute walk test between groups and within groups. Both groups response to the treatment were analyzed using paired 't' test .

The formula is

$$s = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

d = difference between pre test Vs post test values

$\bar{d}$ = mean difference

n = total number of subjects

s = standard deviation

Unpaired ‘t’ test:

The unpaired ‘t’ test was used to compare the statistically significant difference between Group A and Group B.

Formula: Unpaired ‘t’ test:

$$s = \sqrt{\frac{(n_1 - 1)s_1^{\,2} + (n_2 - 1)s_2^{\,2}}{n_1 + n_2 - 2}}$$

$$t = \frac{\left|\bar{x}_1 - \bar{x}_2\right|}{s\sqrt{{}^1/_{n_1} + {}^1/_{n_2}}}$$

n_1 = total number of subjects in group A

n_2 = total number of subjects in group B

x_1 = difference between pre test Vs post test of group A

$\bar{x}_1$ = mean difference between pre test Vs post test of group A

x_2 = difference between pretest Vs post test of group B

$\bar{x}_2$ = mean difference between pre test Vs post test of group B

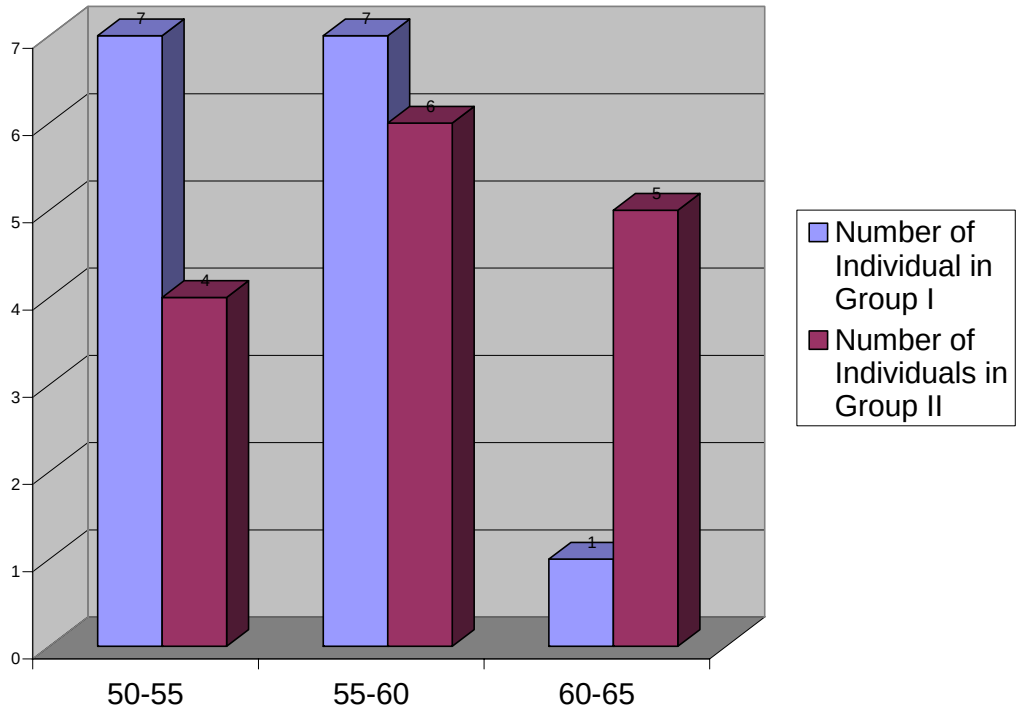
s = standard deviation.

DATA PRESENTATION.

Table I : Demographic presentation of age

Content		Number of individuals in Group I	Number of individuals in Group II
Age	50-55	7	4
	55-60	7	6
	60-65	1	5

Graph I; Demoraphic presentation of age

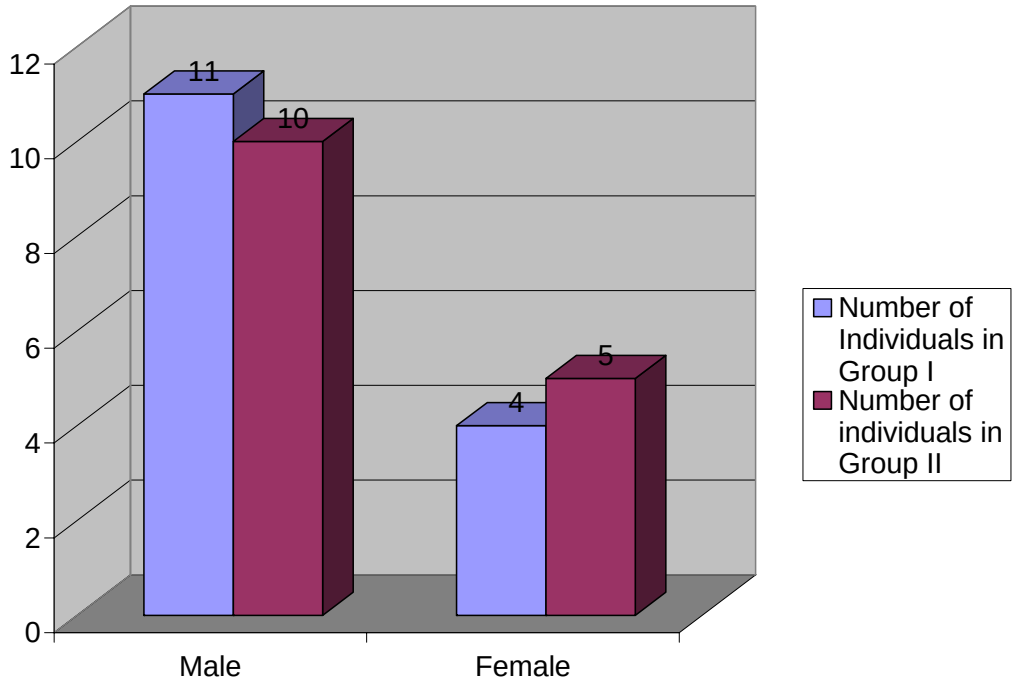


The conventional group (Group I) consisted of total 15 patients, whole mean age was found to be 55.333 and the experimental group (Group II) consisted of total 15 patients whose mean age was found to be 57.533

Table II :Demographic representation of sex

Content		Number of individuals in Group I	Number of individuals in Group II
sex	Male	11	10
	Female	4	5

Graph No. II : Demographic Presentation of Sex



73.33% of patients in Group 1 were males and 26.66% of patients in group I were females.

66.66% of patients in Group II were males and 33.33% of patients in Group II were females.

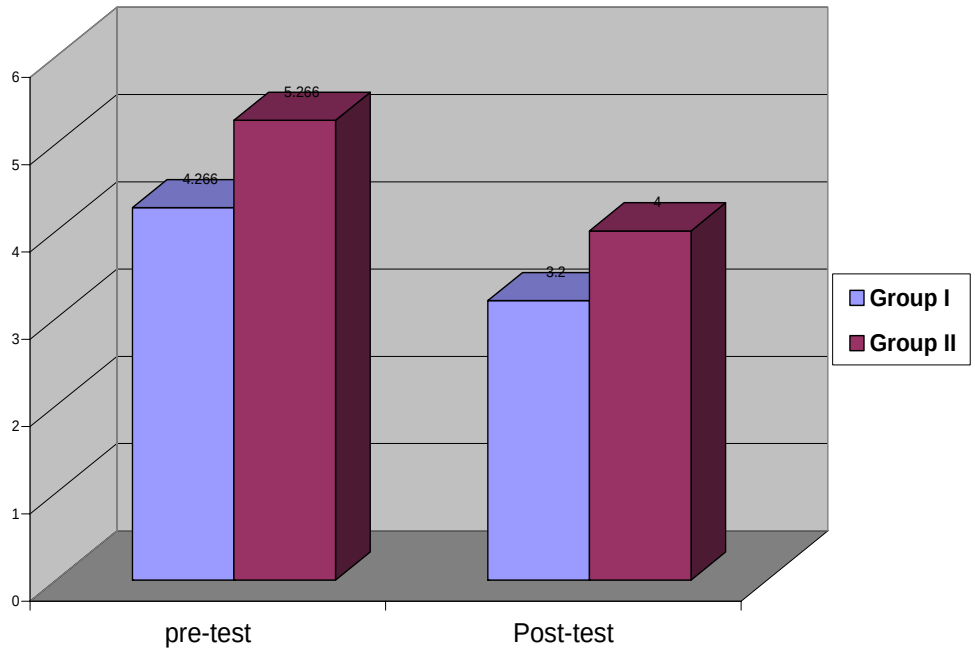
Analysis of Results – Rate of perceived exertion.

Table III ;Statistical results – Rate of perceived exertion.

Group	Pre-Test mean	Independent 't' test value	Post –test mean	Independent 't' test value	Dependent 't' test value	% of decrease in rate of perceived exertion.
Group I	4.266	1.331	3.200	1.362	16.000	24.988
Group II	5.266		4.000		16.000	24.041

1st week and 4th week mean of rate of perceived exertion.

Graph III;



USING DEPENDENT 'T' TEST

Comparing 1st week and 4th week values rate of perceived exertion. Group I

The mean pre-test value of perceived exertion score is 4.266 and post test score is 3.200. calculated 't' value 16.000 is greater than table value [t = 2.145] at 55 level of significance for dependent 't' test, showing there is significant difference between two values.

Comparing 1st week and 4th week value in Group II

The mean pre-test of perceived exertion score is 5.266 and the post-test score is 4.000. calculated 't' test value 16.000 is greater than table value [t=2.145] at 5% level of significance for depended test showing that there is significant difference between two values.

USING INDEPENDENT 'T' TEST

Comparing pre-test rate of perceived exertion scores of Group I and Group II

Pre-test mean rate of perceived exertion score of Group I is 4.266 and Group II is 5.266. The calculated 't' value is 1.331 which is less than the table value [t=2.048] at 5% level of significance showing that there is no significant difference between two groups.

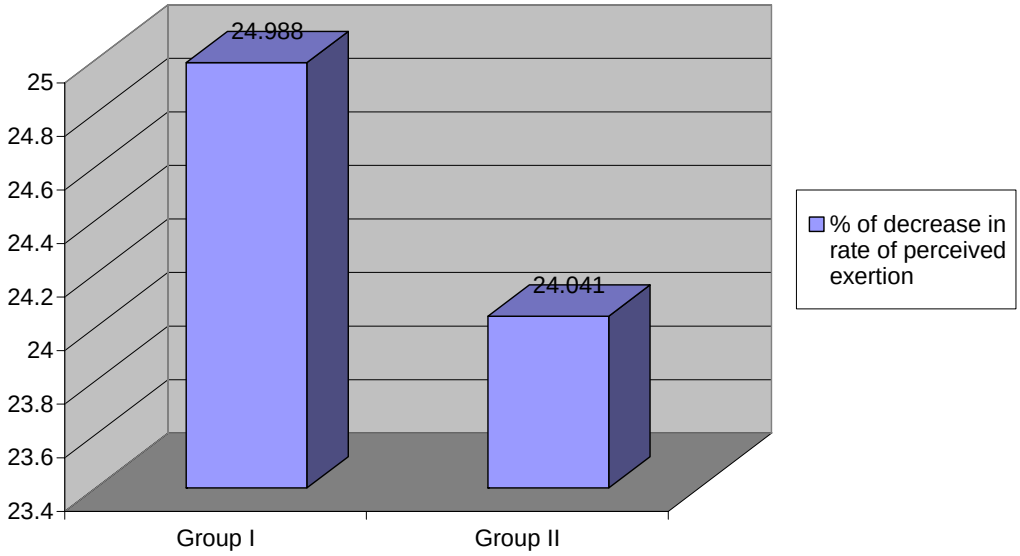
Comparing post-test rate of perceived exertion scores of group I and II

Post –test mean rate of perceived exertion scores of Group I is 3.200 and Group II is 4.000. The calculated ‘t’ value 1.362 is less than table value [t=2.048] at 5% level of significance showing that there is no significant difference between two groups.

Percentage of difference.

Percentage of improvement of rate of perceived exertion score from initial value in Group I is 24.988 and Group II is 24.041. When comparing the percentage of difference in the improvement of rate of perceived exertion score between Group I and Group II there is a less gain of 0.947&.

Graph IV : Percentage of gain of rate of perceived exertion.



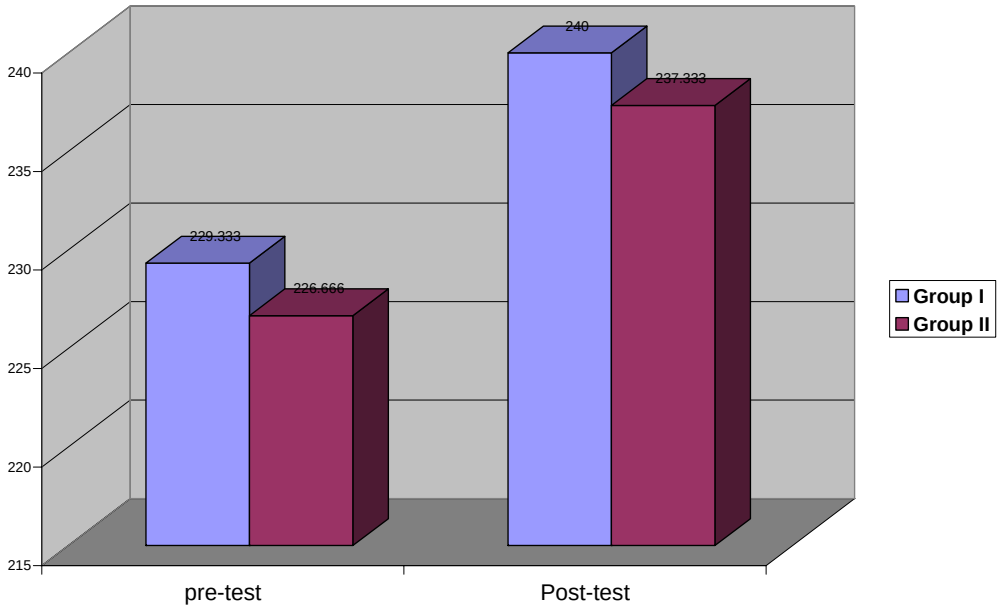
From statistical analysis of rate of perceived exertion is significantly improved in both groups and no significant difference is demonstrated between groups. Hence null hypothesis is accepted.

Analysis of results peak expiratory flow rate

Table IV :Statistical analysis of results – peak expiratory flow rate

Group	Pre-Test mean	Independent 't' test value	Post – test mean	Independent 't' test value	Dependent 't' test value	% of decrease in rate of perceived exertion.
Group I	229.333		240.000		16.000	4.652
Group II	226.666	0.431	237.333	0.452	16.000	4.707

Graph V : 1st week and 4th week mean of rate of perceived exertion



ANALYSIS OF RESULTS

Using Dependent ‘t’ test

Comparing 1st Week and 4th week values of peak expiratory flow rate score in Group I

The mean pre-test peak expiratory flow rate score is 229.333 and post test score is 240.000. calculated ‘t’ value 16.000 is greater than the table value (2.145) at 5% level of significance for dependent test, showing there is significant difference between two values.

Comparing 1st Week and 4th Week Values in Group II

The mean pre-test peak expiratory flow rate score is 226.666 and post-test value is 237.333. calculated ‘t’ value is 16.000 is greater than table value [t=2.145] at 55 level of significance for dependent test showing that there is significant difference between two values.

Using independent ‘t test

Comparing pre-test peak expiratory flow rate scores of Group I and Group II.

Pre-test mean peak expiratory flow rate scores of Group I is 229.333 and Group II is 226.666. The calculated ‘t’ value 0.431 is less than table value [t=2.048] at 5% level of significance showing that there is no significant difference between two groups.

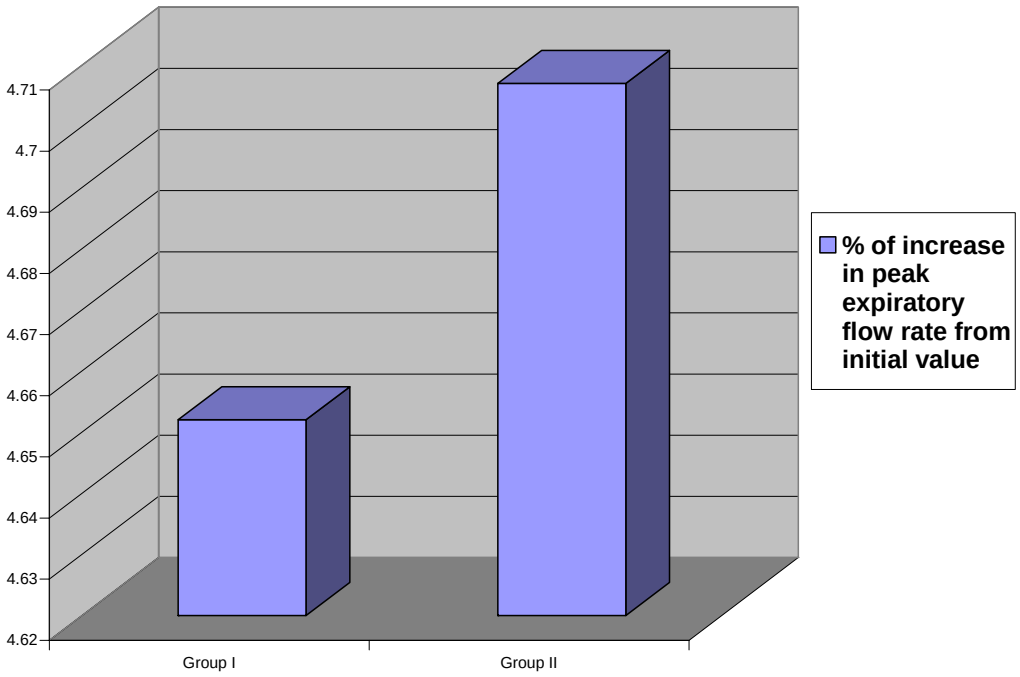
Comparing post-test peak expiratory flow rate score of Group I and Group II

Post-test mean peak expiratory flow rate score of Group I is 240.000 and Group II is 237.333. The calculated 't' value 0.452 is less than the table value [t=2.048] at 5% level of significance, showing that there is no significant difference between tow groups.

Percentage of difference.

Percentage of improvement of peak expiratory flow rate score from initial value in Group I is 4.652 and Group II is 4.707%. When comparing percentage or difference in improvement of peak expiratory flow rate score between group I and Group II there is a less gain of 0.055% for Group II at the end of the treatment.

Graph VI: % of gain of peak expiratory flow rate score



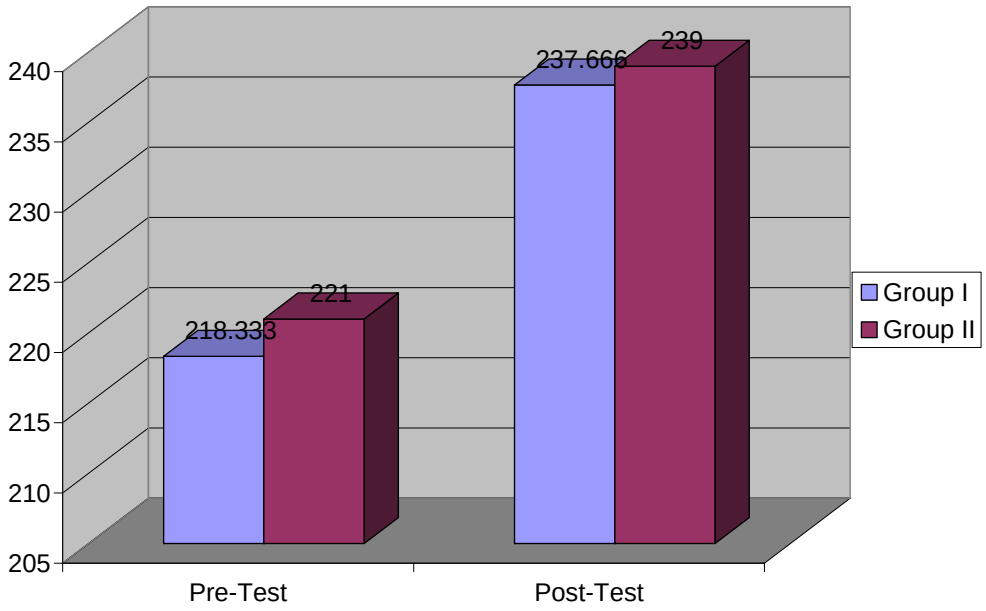
From statistical analysis of peak expiratory flow rate is significantly improved in both groups and no significant is demonstrated between groups hence null hypothesis is accepted.

Analysis of results – Six minute walk test

Table V : Statistical result – Six minute walk test

Group	Pre-Test mean	Independent 't' test value	Post – test mean	Independent 't' test value	Dependent 't' test value	% of decrease in rate of perceived exertion.
Group I	218.333	0.495	237.666	0.242	29.000	8.854
Group II	221.000		239.000		16.837	8.144

Graph VII: Pre & Post test Mean value of Six minute walk test



Analysis of Results

Using dependent ‘t’ test

Comparing 1st week and 4th week values of six minute walk test score in Group I

The mean pre-test six minute walk test score is 218.333 and post-test score is 237.666. calculated ‘t’ value 29.000 is greater than table value [2.145] at 5% level of significance for dependent test, showing there is significant difference between two values.

Comparing 1st week and 4th week value in Group II

The mean pre-test six minute walk test score is 221.000 and post-test value is 239.000. Calculated ‘t’ value 16.837 is greater than table value [t=2.145] at 5% level of significance for dependent test, showing that there is a significant difference between tow values.

Using independent ‘t test

Comparing pre-test six minute walk test scores of Group I and Group II

Pre-test mean six minute walk test scores of Group I is 218.333 and Group II is 221.000. The calculated ‘t’ value 0.495 is less than table value [t=2.048] at 5% level of significance, showing that there is no significant difference between two groups.

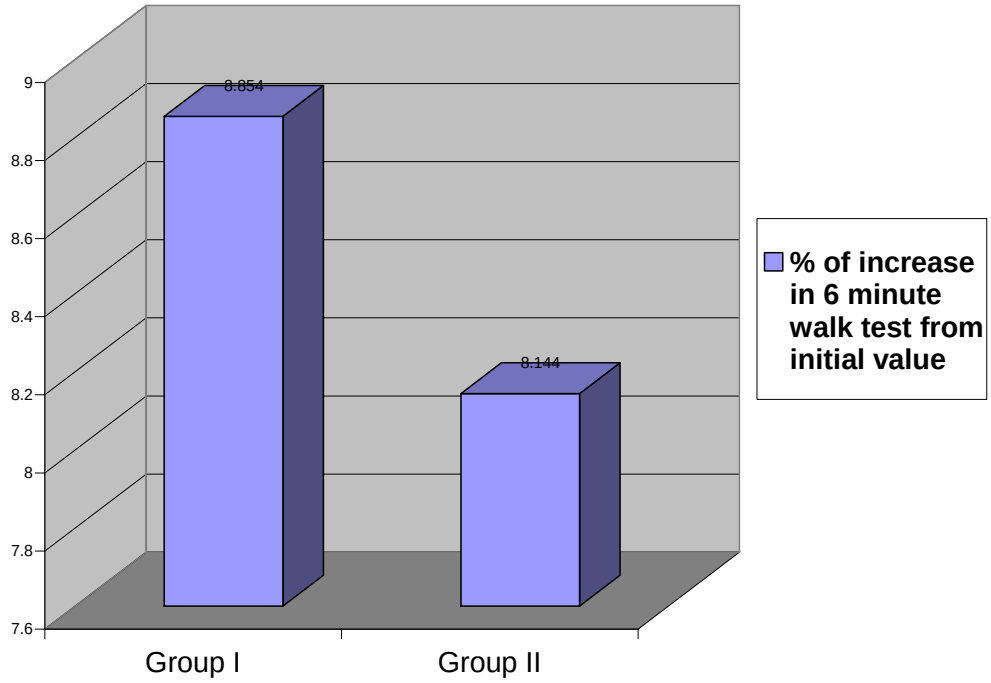
Comparing post-test six minute walk test scores of Group I and Group II

Post –test mean six minute walk test scores of Group I is 221.000 and Group II is 239.00. The calculated ‘t value 0.242 is lower than the table value [t=2.048] at 5% level of significance, showing that there is no significant difference between the groups.

Percentage of difference.

Percentage of improvement of six minute walk test score from initial value in Group I is 8.854 and Group II is 8.144. When comparing the percentage of difference in six minute walk test score between Group I and Group II, there is a less gain of 0.71% of the end of the treatment.

Graph VIII: Percentage of gain of six minute walk test



From statistical analysis of six minute walk test is significantly improved in both groups and no significant difference demonstrated between groups hence null hypothesis is accepted.

DISCUSSION

The study is an experimental comparative study to find out the effectiveness or Proprioceptive Neuromuscular Facilitation Breathing Techniques and Conventional Breathing Techniques in patients with Chronic Obstructive Pulmonary Disease. Both study groups selected in the study were assessed on the first day and 30th day of treatment, the tools taken fro measuring the outcome were rte of perceived exertion (Modified Borg Scale). Peak expiratory flow rate and six minute walk test.

Group I received Conventional Breathing Techniques which involved Diaphragmatic and Purse-Lip breathing Techniques. Group II received Propriocepetive neuromuscular Facilitation Breathing Techniques in addition to conventional Breathing Techniques. Both treatments were applied 8 minutes twice daily for 4 week.

On statistical analysis using ‘t’ test both groups did not shown any significant improvement in pre and post test scores or rate of perceived exertion, peak expiratory flow rate and six minute walk test when both groups were compared.

On statistical analysis using ‘t’ test for rate of perceived exertion, post-test mean, rate of perceived exertion score of Group I was 3.200 and of Group II is 4.000. The calculated ‘t’ Value 1.362 is less than table value [t=2.048] at 5% level of significance, showing that there is no significant difference between two groups. When comparing percentage of difference in the improvement of rate of perceived exertion score

between Group I and Group II, there is less gain of 0.947%. From statistical analysis, rate of perceived exertion significantly in both groups and no significant difference demonstrated between groups thus accepting the null hypothesis-1 that there is no significant difference between Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Technique in improving rate perceived exertion in patients with Chronic Obstructive Pulmonary Disease.

On statistical analysis using ‘t’ test for peak expiratory flow rate, post-test mean peak expiratory flow rate score of Group I was 240.000 and Group II was 237.333. The calculated ‘t’ value of 0.452 is less then the table value [t=2.048] at 5% level of significance, showing that there is no significant difference between two groups. When comparing the percentage of difference in improvement of peak expiratory flow rate between Group I and Group Ii, there is a less gain of 0.055%

From statistical analysis, peak expiratory flow rate significantly improved in both groups and no significant difference demonstrated between groups thus accepting null hypothesis -2 that there is no significant difference between proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques in improving peak expiratory flow rate in patients with Chronic Obstructive Pulmonary Disease.

On statistical analysis using ‘t’ test for six minute walk test, post-test mean six minute walk test score of Group I was 221.00 and Group II was 239.00. The calculated ‘t’ value of 0.242 is less than the table value [t=2.048] at 5% level of significance showing that there is no significant difference between two groups. When comparing the percentage of

difference in the improvement of six minute walk test between Group I and Group II there is less gain of 0.71% from statistical analysis. Six minute walk test significantly improved in both groups thus accepting null hypothsis-3, that states that there is no significant difference between Proprioceptive Neuromuscular Facilitation Breathing Techniques and Conventional Breathing technique in improving six minute walking distance in patients with Chronic Obstructive Pulmonary Disease.

Even though statistically not significant, Proprioceptive Neuromuscular Facilitation Breathing Technique shown slight improvement in rate of perceived exertion, peak expiratory flow rate and six minute walking distance. This could be the result of reflexive responses produced in ventilatory muscles which affects both psychological and physiological aspects of dyspnoea as we well as tolerance and adaptation to exercise. Tolerance and adaptation to exercise is most probably due to mechanism by which Proprioceptive Neuromuscular Facilitation Breathing controls dyspnoea, respiratory rate, breathing pattern, air trapping and work of breathing. On clinical examination the above said responses are accompanied by changes in breath sounds, effective coughing, less necessity for suctioning, a normal respiratory pattern and retention of improved breathing pattern for some time after treatment period.

Janet Larson in his study " Cycle ergometer and inspiratoy muscle training in chronic obstructive pulmonary disease" states that addition of inspiratory muscle strength training did not produce significant additional benefits in exercise performance and dyspnoea in Chronic Obstructive Pulmonary Disease patients. Since Proprioceptive Neuromuscluar Facilitation is a strengthening programme, above said findings of Janet

Lerson can support the reason for lack of significant difference between both the groups. This may be due to the reasons that both exercises produce same effects of increasing ventilation thereby reducing dyspnoea, air trapping and improvement in exercise tolerance which reduces energy expenditure of breathing.

SUMMARY AND CONCLUSION

This experimental comparative study was conducted to assess the effectiveness of Proprioceptive Neuromuscluar Facilitation Breathing Technique and Conventional Breathing Technique in improving rate of perceived exertion, peak expiratory flow rate and six minute walking distance in patients with chronic obstructive pulmonary disease. Thirty patients were conveniently selected and divided into Group I and Group II of 15 patients in each group. A detailed assessment was taken for patients in each group.

Group I received conventional Physiotherapy which includes Diaphragmatic Breathing and Pursed-Lip Breathing techniques and Group II received Proprioceptive Neuromuscular Facilitation Breathing Technique in addition to conventional Breathing Techniques. Both treatments were applied for 8 minutes twice daily with 16 repetitions for each Conventional Breathing Techniques and 6 repetitions for each Proprioceptive Neuromuscular Facilitation Breathing Technique for 4 weeks. The outcome measures taken were rate of perceived exertion, peak expiratory flow rate, six minute walking distance, which were recorded before and after the completion of whole treatment. Values obtained were statistically tested using ‘t’ test. The results have shown that there is no significant difference between proprioceptive neuromuscular facilitation breathing Techniques and Conventional Breathing Technique in improving rate of perceived exertion, peak expiratory flow rate and six minute walk test in patients with Chronic Obstructive Pulmonary Disease.

Limitations.

- Study was conducted for short period of time.
- Since study time was short, only limited sample size could be considered for the study.
- No follow-up could be done.

CONCLUSION

On the basis of above discussion and analysis of outcome, it is suggested that though Proprioceptive Neuromuscular Facilitation Breathing Technique produces benefits in treating Chronic Obstructive Pulmonary Disease, it does not produce any significant added benefits by itself when it is compared with Conventional Breathing Techniques.

The conclusion of study reveals that both Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques are effective in improving dyspnoea, lung function and exercise tolerance in patients with Chronic Obstructive Pulmonary Disease.

This was shown by improvement in rate of perceived exertion, peak expiratory flow rate and six minute walking distance. Both Proprioveptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Technique used in the study ensure good dyspnoea control, improvement in exercise tolerance and lung function.

Since ‘t’ test does not record any significant improvement in the parameters like rate of perceived exertion, peak expiratory flow rate and

six minute walk test, the study concluded by accepting null hypothesis which is stated as

“The is no significant difference between Proprioceptive Neuromuscular Facilitation Breathing Technique and Conventional Breathing Techniques in improving rate of perceived exertion, peak expiratory flow rate and six minute walk test in patients with Chronic Obstructive Pulmonary Disease”.

RECOMMENDATION

Suggestions.

- To establish efficacy of treatment large sample size study required.
- Large term follow-up to analyze the effects.
- More objective parameters could be utilized in recorded the efficacy of this parameters thus applying the techniques in lung disease other then Chronic Obstructive Pulmonary Disease and Comparing the efficacy.
- Further study should include more measurement tools

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APPENDIX I

MODIFIED BORG SCALE

scale	severity
0	No breathlessness at all
0.5	Very Very slight (just noticeable)
1	Very slight
2	Slight breathlessness
3	moderate
4	Somewhat severe
5	Severe breathlessness
6	
7	Very severe breathlessness
8	
9	Very very severe 9almost maximum)
10	maximum

APPENDIX II

ASSESSMENT CHART

Name :

Age :

Sex :

S.No	Parameter	Pre-test	Post-test
1	Rate of perceived exertion (Borg scale)		
2	PEFR (lit/minute)		
3	Six minute walking distance (Feet)		

APPENDIX III

EVALUATION CHART

SUBJECTIVE ASSESSMENT DATE OF ASSESSMENT

NAME :

AGE :

SEX :

OCCUPTION :

REF. BY. DR. :

WEIGHT :

HEIGHT :

CHIEF COMPLAINTS OF THE PATIENT

HISTORY

PRESENT MEDICAL HISTORY

PAST MEDICAL HISTORY

PERSONAL HISTORY

ASSOCIATED PROBLEMS

H/O ALLERGENS

FAMILY HISTORY

OCCUPATIONAL HISTORY

SOCIO ECONOMIC STATUS

PSYCHOLOGICAL HISTORY

EVALUATION OF CARDINAL SYMPTOMS

CHEST WALL PAIN.

Pleuritic ----------

Muscle ----------

Skeletal ----------

Neuralgic ----------

Angina ----------

COUGH

Nocturnal cough ----------

Productive cough ----------

Prolonged cough ----------

Early morning productive cough ----------

Short cough ----------

Cough syncope ----------

SPUTUM

Consistency ----------

Smell ----------

Colour ----------

HAEMOPTYSIS

DYSPNEA ----------

ORTHOPENA ----------

TREPOPNEA ----------

PAROXYSMAL NOCTURAL DYSPNEA ----------

PLATYPNEA ----------

MODIFIED BORG SCALE SCORE_____

WHEEZE_____

CLYBBING _____ GRADE_____

CYANOSIS

OBJECTIVE ASSESSMENT

VITAL SIGNS

- HEART RATE
- RESPIRATORY RATE
- BLOOD PRESSURE

- TEMPERATURE

ON OBSERVATION

- BUILT
- POSTURE

FACE EVALUTION

- COLOUR
- DISTRESS
- PUFFINESS

NECK EVALUATION

- USAGE OF ACCESSORY MUSCLES
- DISTENSION OF VEINS

CHEST WALL

- EXPANSION
- MOVEMENT
- DEFORMITIES
- PATTERN OF BREATHING
    - RATE
    - DEPTH
    - RHYITM

SPINAL DEFORMITIES

- SCOLIOSIS
- KYPHOSIS
- KYPHOSCOLIOSIS

- ANKYLOSING SPONDYLOSIS

EXPTERNAL APLIANCES

ON PALPATION

- TRACHEAL SHIFT
- TENDERNESS OVER CHEST WALL
- ACCSESSORY MUSCLE SPASM
- TACTILE FREMITUS
- MOVEMENT OF DIAPHRAGM

ON PERCUSSION

- RESONANT
- HYPER RESONANT
- HYPO RESONANT
- DULL

ON AUSCULTATION

- WHEEZE
- CREPITATION

BREATH SOUND

- TRACHEAL
- BRONCHIAL
- BIAPHRAGMATIC
- VOCAL RESONANCE
- PLEURAL RUB
- PERICADIAL RUB

HEART SOUNDS

- MITRAL
- TRICUSPID
- AORTIC
- PULMONARY
- ERBS POINT
- MURMERS

ON EXAMINATION

CHEST EXPANSION

AXILLARY ___ (cm) NIPPLE____(cm) XIPHOID PROCESS_____ (cm)

E.C.G. :

ECHO CARDIOGRAM :

CHEST XRAY :

ABGa :

ULTRA SOUND SCAN :

MRI :

BRONCHOSCOPY :

CLINICAL DIAGNOSIS:

TREATMENT GIVEN ON THE BASIS OF RESEARCH

GROUP

EXPERIMENTAL :

NON EXPERIMENTAL :

TREATMENT

PRETEST SCORES :

PEAK EXPIRATORY LOW RATE [PEFR] :

BORG SCALE :

6 MINUTE WALKING DISTANCE[6MWS] :

POST TEST SCORES

PEAK EXPIRATORY LOW RATE [PEFR] :

BORG SCALE :

6 MINUTE WALKING DISTANCE[6MWS] :

REMARKS

INFORMED CONSENT TO PARTICIPATE VOLUNTARY IN A RESEARCH INVESTIGATION

Name :

Age :

Sex :

Occupation :

Address for communication :

Declaration:

I have fully understood the nature and purpose of the study. I accept to be a subject in this study. I declare that the above information is true to my knowledge.

Date: Signature of the subject.

Place: